REMARKS

This response is offered in reply to the office action of November 8, 2006. A petition and fee for two (2) month time extension are enclosed.

Applicant appreciates withdrawal of the Section 103 rejection of claims 11-16 based on the Murphy patent taken with the Duhl et al. patent and the EP '489 document.

Claims 11-16 now are rejected under 35 USC 103(a) in view of the Nishihata JP-2000-042755 (JP'755) taken with the Warnes et al. US Patent 5,989,733 ('733 patent).

Claims 11-16 are believed to distinguish over JP'755 taken with the '733 patent. For example, claim 11 recites a coated article comprising the recited superalloy substrate composition, an outwardly grown diffusion aluminide bondcoat on the substrate, and a ceramic thermal barrier coating disposed on the bondcoat wherein spallation life of the ceramic thermal barrier coating during cyclic oxidation is prolonged.

Applicant's Figures 3, 4, and 5 and specification pages 8-10 illustrate the significant and unexpected prolongation of spallation life of the ceramic thermal barrier coating achieved when the ceramic thermal barrier coating is disposed on the recited outwardly grown diffusion aluminide bondcoat on the recited superalloy substrate composition.

This significant prolongation of spallation life of the thermal barrier coating is unexpected from the oxidation resistance exhibited by the bondcoated alloys shown in Applicant's Figure 2 where the outwardly grown diffusion aluminide bondcoated alloys are designated MDC-150L and the inwardly grown diffusion aluminide bondcoated alloys are designated LDC-2E.

With respect to the obviousness rejection, the examiner compares alloy compositions on page 3 of the office action. However, Applicant would note first that the alloy composition of JP'755 is a welded alloy for high pressure piping and is designed to meet certain welding requirements. In contrast, Applicant's claims involve a coated article having a thermal barrier coating system.

Applicant notes second that there are certain errors in the examiner's comparison table on page 3. For example, Applicant's Cr and Zr ranges are incorrect in the table and should be about 3 to about 12 weight % Cr and up to about 0.10 weight % Zr.

Applicant notes third that the Cr range (1-18%) and Al range (1.5-15%) of JP'755 are so much broader than the Cr and Al ranges of Applicant as to be non-suggestive with respect to Applicant's claim 11.

Applicant notes fourth that the Hf, Ta, and W ranges of the welded alloy of JP'755 start with 0 weight % such that these elements are not even required in the welded alloy, rendering JP'755 utterly non-suggestive with respect to Applicant's claim 11.

Moreover, given that the JP'755 alloy is a welded alloy for high pressure piping, there can be no suggestion whatsoever in JP'755 that a superalloy composition including hafnium when provided with an outwardly grown diffusion aluminide coating and ceramic thermal barrier coating exhibits a significant and unexpected prolongation of spallation life of the ceramic thermal barrier coating as demonstrated by Applicant's Figures 3, 4, and 5 and specification pages 8-10.

Finally, JP'755 simply does not suggest Applicant's recited coated article comprising Applicant's superalloy substrate composition coated with an outwardly grown diffusion aluminide coating and ceramic thermal barrier coating wherein the ceramic thermal barrier coating exhibits a significant and unexpected prolongation of spallation life of the ceramic thermal barrier coating when it is disposed on the recited bondcoat on the recited superalloy substrate composition.

To make up for the acknowledged deficiencies of JP'755, the examiner cites the '733 patent as showing a nickel base superalloy with a ceramic thermal barrier over an outwardly grown platinum aluminide bondcoat.

However, Applicant does not believe the '733 patent can be properly combined with JP'755 as proposed by the examiner, unless such combination is supported by a prohibited hindsight analysis of Applicant's claims. As mentioned above, JP'755 involves a welded alloy for high pressure piping having different requirements of the alloy, and there is no suggestion in JP'755 of any need for a thermal barrier coating system on the welded alloy.

Moreover, Applicant notes that there is no suggestion in the '733 patent that a superalloy composition including hafnium when provided with an outwardly grown diffusion aluminide coating and ceramic thermal barrier coating exhibits a significant and unexpected prolongation of spallation life of the ceramic thermal barrier coating as demonstrated by Applicant's Figures 3, 4, and 5 and specification pages 8-10.

Neither JP'755 nor the '733 patent remotely suggests Applicant's coated article comprising the recited superalloy composition coated with an outwardly grown diffusion aluminide coating and ceramic thermal barrier coating exhibiting a significant and unexpected prolongation of spallation life of the ceramic thermal barrier coating by virtue of Applicant's combination of recited nickel base superalloy/outwardly grown diffusion aluminide bondcoat/thermal barrier coating.

Enclosed with his last-flied response, Applicant provided copies of two technical articles to the previous examiner Jenkins, which are <u>not</u> prior art documents. Applicant asks the current examiner to review these articles, which Applicant believes rebut the current obviousness rejection of claims 11-16. In particular, the first technical article by Clarke and Levi entitled "Materials Design For the Next Generation Thermal Barrier Coatings", Annu. Rev. Mater. Res. 2003, 33:383-417 discusses the status of thermal barrier coating systems comprising a yttria-stabilized zirconia (YSZ) thermal barrier coating deposited onto an oxidation resistant bondcoat applied on a nickel based superalloy component.

On pages 389-390, the article discusses different types of bondcoats and methods of applying them and concludes that "[i]t is uncertain at this time which of these coating types is best for different applications. In large part this is because it is not yet known which combination of materials properties leads to the longest, high temperature life of the coating". On page 390, last paragraph, the article states that "[t]here is substantial circumstantial evidence to suggest that many of the TBC failures are associated with the oxidation of the bondcoat(4). Indeed, a number of manufacturers are believed to use an oxidation criterion as a basis for predicting average life".

As noted above and as is apparent from the above Clarke and Levi technical article, Applicant's significant prolongation of spallation life of the thermal barrier coating is unexpected from the oxidation resistance exhibited by the bondcoated alloys shown in Applicant's Figure 2. The incorrectness of the current examiner's hindsight analysis-based rejection is apparent from the first technical article.

The second technical article by Levi entitled "Emerging materials and processes for thermal barrier systems", Current Opinion in Solid State and Materials Science, Volume 8, Issue 1, January 2004, pages 77-91, emphasizes in Section 2. "The Thermal barrier system" that a system perspective must be taken where interplay between the substrate alloy, bondcoat, and thermal barrier coating must be considered. The incorrectness of the current examiner's hindsight analysis-based rejection is also apparent from the second technical article.

Applicant believes claim 11 is not suggested by the teachings of the cited references and can only be obtained from the cited references by a prohibited hindsight analysis of the claimed invention. The hindsight nature of the examiner's obviousness rejection is believed to be apparent from the two technical articles, which are discussed above and which are subsequent in time to Applicant's claimed priority filing date.

Achievement of a significant and unexpected prolongation of spallation life of a ceramic thermal barrier coating by virtue of Applicant's particular claimed combination of recited nickel base superalloy composition/outwardly grown diffusion aluminide bondcoat/thermal barrier coating of claim 11 is not remotely suggested in the cited references taken alone or together. The same applies to claims 12-16 which recite certain rare earth elements and their concentration, sulfur concentration, and hafnium concentration.

Applicant adds new claim 17 reciting that the substrate is a gas turbine engine blade. Although no additional claim is believed to be due for claim 17, the Commissioner is authorized to charge any fee for claim 17 to my deposit account No. 20-1124.

Applicant believes the pending claims are in condition for allowance and such action is requested.

Respectfully submitted,

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enclosure: Post Card

CERTIFICATE OF MAILING

I hereby certify that this correspondence and enclosures are being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450, on April 6, 2007.

Edward J. Timmer